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Title: A submission example to Plasma Picture of the Day (PPOD)

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Intended for: Web publication

A submission example to PPOD:

Title: Colorful plasma columns (the field-of-views are about 15 cm across)

Authors: Zhehui (Jeff) Wang, Mark F. Makela (Los Alamos National Laboratory), Julia Falkovitch-Khain and Mark Kushner (University of Michigan).

Description: End-on views from a steady plasma column that was about 2 m long. Left, hydrogen gas was used. Right, argon gas was used. The gas pressures were about 0.15 Torr, or 20 Pa. The whitish color of the hydrogen plasma on the left was not expected, since a reddish color, like The Whirlpool Galaxy in Dust and Stars, is more common for hydrogen discharges. The reddish color is due to the H-alpha line at 656.28 nm. The whitish color was attributed to molecules of hydro-carbon that came from chemical reactive sputtering of a carbon electrode by hydrogen atoms and ions. At the end of each column, the plasmas terminated by dumping charged particles to the wall, resulting in a white glow at a random location.

Imaging method: Canon Powershot SX100 IS, 8.0 Mega Pix with 10x zoom. Built-in lens. Snap shot.

Additional information: Further information about chemical sputtering and other plasma interaction with matter can be found, for example, in the book *Principles of Plasma Discharges and Materials Processing* by M. A. Lieberman and A. J. Lichtenberg. Work supported by Los Alamos National Laboratory LDRD program and US Department of Energy. Contact: zwang@lanl.gov;